

U.S. Patent Application No. 09/825,582
Amendment After Final dated April 7, 2004
Reply to final Office Action dated January 7, 2004

REMARKS/ARGUMENTS

Reconsideration and continued examination of the above-identified application are respectfully requested.

The amendment to the claims is editorial in nature. In particular, the amendments to claims 24 and 25 correct typographical errors which were pointed out by the Examiner. Claim 26 has been amended to correct the dependency. Entry of this amendment is respectfully requested. This amendment does not necessitate any further searching on the part of the Examiner nor does it raise any new questions of patentability since the Examiner has already examined claims having the scope set forth in these claims and the Examiner appreciated the typographical errors. Furthermore, the amendment places the application in condition for allowance or at the very least, in a better condition for appeal. Accordingly, entry of this amendment is respectfully requested.

At page 2 of the Office Action, the Examiner indicates that in light of the arguments set forth in the previous response dated October 3, 2003, the rejection of the claimed invention under 35 U.S.C. § 102(b) over Reznick et al. is withdrawn. The applicant and the undersigned appreciate the Examiner's indication that the claimed invention is not anticipated by Reznick et al. The applicant believes that in view of the following comments, the claimed invention will also be allowable over Ullmann's Encyclopedia of Industrial Chemistry (hereinafter, Ullmann) and Mayer et al.

At page 3 of the Office Action, the Examiner rejects claims 1-4, 7-14, and 17-29 under 35 U.S.C. §102(b) as being anticipated by Ullmann. The Examiner, for the most part, repeats the reasons for rejecting claims 1-4, 7-14, and 17-29 as set forth in the previous Office Action.

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Additionally, with respect to claims 1 and 10, the Examiner states that the applicant failed to distinguish the method of Ullmann from the claimed method. More specifically, the Examiner states that the applicant's argument that carbon foam includes cell structures (bubble like structures) within the carbon, whereas an activated carbon does not include cell structures, is more appropriately drawn to the foam than the method. The Examiner also asserts that Ullmann describes the method of the claimed invention. Therefore, the Examiner asserts that the applicant's argument that a different result is obtained from the method of the claimed invention, results in a lack of enablement rejection under 35 U.S.C. §112, first paragraph, for failure to disclose a critical step.

Additionally, at page 2 of the Office Action, the Examiner states that apparatus limitations in process claims, unless affecting the process in a manipulative sense, are accorded little or no patentability weight in process claims. For the following reasons, this rejection is respectfully traversed.

Claim 1 of the present application recites, in part, a method of making carbon foam comprising pyrolizing a mixture comprising at least one pyrolizable material in the presence of at least one oxidizing source and optionally at least one fuel source other than the pyrolizable material. Furthermore, the present application, at page 4, lines 24-26, states that the oxidizing source is sufficient to at least partially combust the fuel, but the amount of oxidizing source should be controlled such that the pyrolizable material does not completely combust or burn. Accordingly, the purpose of the oxidizing source is to at least partially combust the fuel.

The process described in Ullmann significantly differs from the method of the claimed invention. For instance, the oxidizing source used in the claimed invention is not taught in

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Ullmann. According to the present application, at page 4, lines 18-20, examples of the oxidizing component in the claimed invention are air, oxygen, or both. In contrast, Ullmann describes the use of gases containing combined oxygen, such as steam or carbon dioxide. Steam and carbon dioxide are incapable of combusting fuel, and therefore are not "oxidizing sources" as that term is used in claim 1. The term "combined oxygen" does not mean oxygen but a compound that contains oxygen, like H₂O or CO₂. Additionally, the air and water vapor described in Ullmann, at page 125, are not for pyrolyzing a mixture including at least one pyrolyzable material in the presence of air. The air and water vapor mentioned at page 125 of Ullmann are used to produce surface oxides during or after the activation process. No pyrolyzing is occurring at this stage. Additionally, the air or oxygen containing gases mentioned at page 128 of Ullmann are used to carry out a preoxidation step, which is usually carried out before gas activation. Again, no pyrolyzing is occurring at this stage. Therefore, Ullmann does not teach or suggest "pyrolyzing a mixture ...in the presence of at least one oxidizing source..." as recited in claim 1. The purpose of the air or oxygen containing gases mentioned in Ullmann significantly differs from the purpose of the oxidizing source of the claimed invention.

Moreover, Ullmann, at page 124, defines activated carbon as a collective name for a group of porous carbons. Ullmann, at page 126, describes that to activate a carbon material by gas activation, gases containing combined oxygen, such as steam or carbon dioxide are used to produce fine pores or cracks. In order to produce the fine pores or cracks, the gases containing combined oxygen cannot be used to combust fuel. In fact, Ullmann confirms that the gases containing combined oxygen are not used to combust fuel by stating, at page 126, that the gases containing

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combined oxygen are steam or carbon dioxide, which are not capable of combusting fuel. In order to produce activated carbon, first, gases containing combined oxygen are introduced to carbon containing material. Then, the combination is heated, wherein the gases containing combined oxygen expand to produce fine pores or cracks. If the gases containing combined oxygen are used for combusting fuel, the oxygen would diminish and would no longer exist to be able to produce fine pores or cracks by expanding due to heat treatments. There are clear differences between the method of the claimed invention and the method described in Ullmann.

The Examiner's attention is also drawn to page 131 of Ullmann which further explains gas activation of carbonaceous material. As stated at column 1 on page 131 underneath the heading "4.2.4.2 Gas Activation," gas activation occurs with suitable gases, the most common being steam, carbon dioxide, or the mixtures of these two. Also, at column 2 on page 131, the article further states that oxygen or air is unsuitable as activating gases. In fact, at the bottom of page 131 and continuing onto page 132, Ullmann even states that air or oxygen can be used with acidic surface oxides but "below the ignition temperature." It is clear that in the formation of activated carbon, there is no pyrolyzing occurring and that there is a simple activation of the raw materials. It is respectfully pointed out that there is no mention whatsoever of pyrolyzing occurring in Ullmann. The Examiner's reliance on page 126, column 2 of Ullmann to assert that an oxidizing source is disclosed as oxygen is not understood. Ullmann at page 126, column 2 clearly states that gases are "gases containing combined oxygen, such as steam or carbon dioxide." (Emphasis added). There is no mention of oxygen alone.

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Thus, contrary to the Examiner's statements at page 4, paragraph 6 of the Office Action, the applicants have shown a different process compared to Ullmann as set forth above and therefore, it is also clear that the product resulting from the process would be different. Ullmann clearly does not teach or suggest the claimed method or the resulting product and further, based on the above, there is no lack of enablement based on the Examiner's assumption that the methods are the same when in fact the methods as explained above are quite different.

With respect to the Examiner's assertions that Ullmann discloses coal as the fuel source, the applicants respectfully disagree. Ullmann clearly uses coal as the source to form the activated carbon and does not use the coal as a fuel source. The applicant's further point out that claim 1 of the present application in combination with claim 2 requires the presence of a pyrolizable material as well as a separate fuel source. There is no mention in the claims that the pyrolizable material and the fuel source are the same and in fact, if this was the case, claim 2 would be redundant, which it is not. Clearly, a pyrolizable material must be present as well as a fuel source based on a reading of claims 2 and 3. Thus, Ullmann does not teach or suggest a fuel source separate from at least one pyrolizable material.

Thus, there are clearly three components mentioned in the process of claim 1, namely, a pyrolyzing material, an oxidizing source, and a fuel source. If one takes the Examiner's position that the coal of Ullmann is the fuel source, the Ullmann does not disclose a pyrolizable material. Further, if one takes the Examiner's position that the pyrolizable material of Ullmann is coal, then there is no fuel source disclosed in Ullmann. Clearly, one component is missing no matter what position the Examiner takes with respect to Ullmann and the use of coal. This similarly applies to

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the Examiner's position taken with respect to claims 7, 8, and 9. Therefore, Ullmann cannot possibly anticipate the subject matter of claims 2 and 3.

With respect to claim 4, the applicants respectfully point out that this claim was canceled in the previous amendment. Accordingly, the rejection of this claim is moot.

The Examiner has similar logic with respect to claim 13, for instance where claim 13 recites that the pyrolizable material fuel source, and oxidizing source are added as a mixture. The Examiner argues that this claim would be anticipated since Ullmann indicates that activated carbon includes not only carbon but also small amounts of oxygen and hydrogen. However, the Examiner is taking the reading of Ullmann out of context. Ullmann, at page 125, first column, clearly indicates that activated carbon is carbon and oxygen and hydrogen, which are chemically bonded in the form of various functional groups. All of these components actually make up the activated carbon. Again, the Examiner cannot take the position that the activated carbon serves as the pyrolizable material as well as the fuel source at the same time. Claim 13 clearly recites three separate components that are added as a mixture and clearly Ullmann at page 125, column 1 does not disclose any such mixture. The language relied upon by the Examiner clearly indicates that the oxygen and hydrogen are absolutely part of the activated carbon. Similarly, with respect to claim 14, the Examiner cannot misinterpret claim 14. Claim 14 of the present application clearly recites that at least one pyrolizable material is introduced into a combustion chamber by being dispersed in the fuel source when present or said oxidizing source or both. There is no teaching or suggestion in Ullmann of a pyrolizable material being dispersed in any fuel source or an oxidizing source. Again, the Examiner cannot take the position that the pyrolizable material serves as two components when

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in fact it is only one component. Claim 14 clearly recites two or three components.

With respect to claims 18 and 19, the applicant, as well as the undersigned cannot locate the discussion of the need for an inert environment set forth at page 126 as indicated by the Examiner. Clarification is respectfully requested. Further, these claims are dependent on claim 1 and would be different for at least the reasons previously discussed above.

With respect to the Examiner's comments concerning claim 17, no where in Ullmann is there any mention of the fuel source or oxidizing source being introduced into the combustion chamber prior to the introduction of at least one pyrolizable material. Looking at Figure 23, one cannot tell which ingredient is introduced into the furnace first other than seeing where the outlets are located which does not mean when the injection of the ingredients is occurring.

Claim 10 of the present application recites, in part, that the oxidizing source that is pyrolized in claim 1 is air, oxygen, or both. For the reasons set forth above, Ullmann does not describe pyrolizing with oxidizing sources.

With respect to claim 11, the Examiner states that Ullmann, at page 127, Figure 21, describes oxygen in concentrations between about 0.5% and about 0.75%. Therefore, the Examiner concludes that claim 11 is anticipated by Ullmann.

Figure 21 of Ullmann simply illustrates carbon, oxygen, and hydrogen contents present in bituminous coals. Claim 11 is dependent on claim 1 and recites pyrolizing with the levels recited in claim 11. Again, Ullmann does not teach or suggest pyrolizing with any oxidizing source at any level. Further, these ingredients are present in the coal itself and are not separate from the coal. Furthermore, the Examiner apparently takes the position that the oxygen present in the coal itself

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would serve as the oxygen for purposes of the amount of oxidizing material present with the pyrolizable material and fuel as recited in claim 11. However, again, claim 11, which is dependent on claim 1, clearly would recite the presence of an oxidizing material which is separate from a pyrolizable material and when the fuel is present, a fuel source that is separate from the pyrolizable material as well as the oxidizing material. The Examiner's reliance on the chemical makeup of coal to support the presence of the oxidizing material or fuel source would not be a proper rejection. Claim 11, as well as claim 1 as explained above, clearly requires the presence of separate components. The oxygen, hydrogen, and carbon ratio set forth in Fig. 21 is with respect to the actual chemical makeup of coal. These are not separate components but are the chemical makeup of coal. Therefore, it is clear that Fig. 21 does not support the presence of an oxidizing material in these ratios since the material referred to in Fig. 21 is the coal itself which the Examiner has previously acknowledged as the pyrolizable material for purposes of relying on Ullmann. Therefore, Figure 21 does not teach the amount of the separate oxidizing material as recited in claim 11 of the present application.

With respect to claim 13, as indicated, Ullmann does not teach or suggest a separate pyrolizable material, fuel source, and oxidizing source, as explained above. Therefore, Ullmann cannot possibly anticipate claim 13. This is especially true in view of the Examiner's assertions that activated carbon includes carbon as well as small amounts of oxygen and hydrogen. However, it is respectfully pointed out that this is the makeup of activated carbon and therefore the activated carbon is one component. Ullmann does not teach or suggest a separate fuel source of oxidizing source.

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With respect to claim 17, and the Examiner's reliance on Fig. 23, there is no mention of any pyrolyzing occurring in the rotary kiln. As indicated throughout the article of Ullmann, and with respect to the discussion of Fig. 23, the gas and air are used in the kiln for gas activation with the use of the steam. Gas activation is not pyrolyzing. As previously indicated, gas activation does not result in pyrolyzing but simply is used to form a porous structure by forming cracks. As also stated at page 131, second column, of Ullmann, oxygen or air are unsuitable as activating gases and therefore it is clear that these materials are simply used to achieve a suitable temperature in order for a steam to activate the coal and nothing more.

With respect to the Examiner's rejection of claims 19 and 20, an "oxygen free gas" does not mean an inert gas. Furthermore, it is not clear if the Examiner intended to assert that Ullmann discloses an "oxygen free gas" in section 4.2.5 on page 132, since this term does not appear to exist in this section. However, it is recognized that Ullmann mentions suitable gases such as halogens but it is respectfully pointed out that this reference is clearly with respect to converting the iron into volatile compounds by treating the carbon while it is still hot with gases and has nothing to do with the formation of the activated carbon. Furthermore, the mention of other gases in section 4.2.5 relate to gases used for a 2-stage activation process. Again, this has nothing to do with using such a gas as a carrier stream. In addition, with respect to claim 20, wherein the carrier gas is a fuel source or an oxidizing source, or both, it is respectfully pointed out, as indicated above, that an "oxygen containing gas" as described in Ullmann is not a fuel source or an oxidizing source but would be steam or carbon dioxide. In addition, Ullmann does not show the use of an oxygen containing gas as that term is understood in Ullmann for a carrier stream.

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With respect to claim 21 and the pyrolyzing temperature, as indicated above, Ullmann does not teach pyrolyzing. These temperatures mentioned in Ullmann are clearly with respect to gas activation to form extremely fine pores or cracks using steam or carbon dioxide. The presence of steam and carbon dioxide create a completely different environment than the environment set forth in claim 1 which is an outright pyrolyzing of the material in the presence of at least one oxidizing source. Needless to say, the steam and carbon dioxide would hinder or prevent any pyrolyzing.

With respect to claims 22 and 23 which recite a carbon foam formed by the method of claim 1 or claim 2, as pointed out above, since the process of the claimed invention is quite different from Ullmann, clearly a different product would result. Furthermore, a carbon foam is clearly different from activated carbon.

Furthermore, there is no mention at all in Ullmann, even at page 131, with respect to carbon foam having cells especially cells bordered by thin sheets, windows, struts, or combinations thereof. As clearly indicated in Ullmann, activated carbon at best forms cracks and fissures which are called pores which are cylindrical in shape for the most part. This clearly is not the same as a carbon foam product having cells.

With respect to the Examiner's assertion that section 4.2.4.2 shows a carrier gas, the applicant's respectfully disagree. The "mild oxidizing agent" set forth in this section is clearly with reference to steam or carbon dioxide which is not used as a carrier gas but is clearly used only as an activation gas to form the cracks in the activated carbon. There is no mention in this paragraph of actually using the steam or carbon dioxide as a carrier gas.

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With respect to the Examiner's reliance on page 131, column 2, last full paragraph of Ullmann, there is no mention of a foam structure or the presence of cells bordered by thin sheets, windows, struts, or combinations thereof. This paragraph specifically states that oxygen reacts too fast and by doing so would lead to uncontrollable combustion without producing activation. In the alternative, oxygen can lead to activated material with very large pores. Again, pores are not cells but are cracks in the surface of the activated carbon as clearly mentioned at page 126, last paragraph, second column. In addition, the same comments apply to claim 27.

With respect to claims 28 and 29, there is no mention of the thermal insulating material or polymer compounds in Ullmann. Clearly, activated carbon is not used as a thermal insulating material. At the very least, no reference has been shown to support such an assertion. In addition, with respect to the Examiner's argument that a mineral oil would suffice for purposes of showing a polymer compound, the applicants are unaware of any one characterizing mineral oil as a polymeric compound when present with activated carbon. Mineral oil is not a polymeric compound. Certainly, at page 132, last paragraph, there is no characterization of the mineral oil with the activated carbon being considered a polymer compound.

Finally, the Examiner also states that in a case where a separate fuel is used, the amount of fuel is such that the fuel combustion consumes between 0 and 100% of the oxidizing material. Therefore, if the fuel consumes 0% it is no longer a fuel.

However, the fuel consumes 0% of the oxidizable material, since the oxidizing material is still present, the reaction would be an oxygen rich reaction. Additionally, claims 2-9 and 12-29 are dependent directly or indirectly on claim 1. Therefore, the reasons set forth above with respect to

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the patentability of claim 1 apply equally here. Accordingly, this rejection should be withdrawn.

At page 9 of the Office Action, the Examiner rejects claims 1, 2, 4, 10, 12, and 21-28 under 35 U.S.C. §102(b) as being anticipated by Mayer et al. (U.S. Patent No. 5,908,896). The Examiner, for the most part, repeats the reasons set forth in the previous Office Action for rejecting claims 1, 2, 4, 10, 12, and 21-28 over Mayer et al. Additionally, at page 3 of the Office Action, the Examiner states that claim 1 does not require a fuel, since it is an optional component. Furthermore, the Examiner states that the applicant did not advance arguments that the Examiner's assumption that the method of the claimed invention will inherently form the same product is flawed. Additionally, the Examiner states that if the same method steps produce a different result, then the claims of the present application can be rejected under 35 U.S.C. §112, first paragraph. For the following reasons, this rejection is respectfully traversed.

Claim 1 of the present application recites, in part, a mixture comprising at least one pyrolizable material in the presence of at least one oxidizing source, wherein the pyrolizable material comprises coal, a carbohydrate, sugar, cellulose, or any combination thereof. See previously amended claim 1.

Mayer et al. relates to organic aerogel microspheres which can be used in capacitors, batteries, thermal insulation, adsorptions/filtration media, and chromatographic packings. According to Mayer et al., the microspheres can be pyrolyzed to form carbon aerogel microspheres. Mayer et al. does not teach or suggest any source of fuel. Furthermore, Mayer et al. does not teach or suggest a pyrolizable material that includes coal, carbohydrate, sugar, cellulose, or combinations thereof. The Examiner's rejection of claim 1 and the claims dependent thereon is not fully

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understood. Mayer et al. does not teach or suggest the specific pyrolizable material recited in the method of claim 1. The Examiner has not explained nor addressed this limitation in the Office Action. Further, claim 4 was previously cancelled. Thus, the Examiner's rejection of this claim is not understood. The Examiner's request for "clarification" is not understood either, since this claim is no longer an issue. Clarification is respectfully requested.

With respect to the rejection of the product claims of claims 22 and 23, the Examiner asserts that since the method has the same steps, the same product will inherently result. However, the applicants respectfully disagree. As stated above, Mayer et al. does not use the same process. Mayer et al. clearly does not teach or suggest pyrolizing using the pyrolizing material set forth in claim 1. Since the process steps are clearly different, the Examiner's assumptions are incorrect and clearly a different product would result since a different pyrolizing is occurring. It again must be remembered that Mayer et al. specifically states, as acknowledged by the Examiner in claim 5 of Mayer et al., that the organic aerogel microsphere is pyrolized. The pyrolizable material set forth in claim 1 in no way relates to an organic aerogel microsphere. Clearly, the process is different and the result is different. In addition, the claims dependent on claims 22 or 23 would equally be different for these reasons. Accordingly, all of the Examiner's arguments have been addressed and clearly, the rejection is not proper. Accordingly, this rejection should be withdrawn.

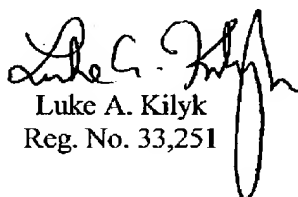
CONCLUSION

In view of the foregoing remarks, the applicant respectfully requests reconsideration of this application and the timely allowance of the pending claims.

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If there are any other fees due in connection with the filing of this response, please charge the fees to Deposit Account No. 03-0060. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such extension is requested and should also be charged to said Deposit Account.

Respectfully submitted,


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